

A Built-for-Purpose Coiled Tubing Rig

DE-PS26-03NT15474

Goal

The project goal is to develop a microhole coiled tubing drilling (CTD) rig capable of drilling a 3½-inch open hole to 6,000 ft total measured depth with a 1,000-foot lateral section. The rig will be capable of rotary and coiled tubing drilling and be able to drill efficiently, safely, cost-effectively, and with minimal environmental impact.

Performer

*Schlumberger Well Services
Sugar Land, TX*

Results

The project started with the review of current CTD rigs, with a plan to modify an existing rig for use as a microhole CT rig (MCTR). Research showed that the majority of built-for-purpose CTD rigs were very large and could prove difficult to move about on small lease roads. This led to a plan to reduce the overall size of the units, without hindering any of the efficiency factors that current purpose-built units have.

Phase 1 is complete, in which many technical issues regarding the operation of the MCTR were addressed. These technical issues then were used to generate a concept for the development of a built-for-purpose MCTR.

Benefits

Microhole technology offers an alternative to conventional rotary drilling techniques. Rotary drilling typically has larger completion sizes due to limitations imposed by jointed pipe. These larger completions account for higher costs for drilling, completion, and disposal. The CTD rig's part in microhole technology is to keep the operating cost to a minimum so that all of the economic benefits of drilling a microhole can be realized.

Cost savings to the operator could be as much as \$1,071,144 per year. The estimated cost savings was based primarily on increases in efficiency compared with conventional units and the reduction of accidents. Based on economic calculation, the MCTR could perform an additional 50



Coiled tubing unit to be modified.

days of drilling, or nearly \$1,100,000 worth of billable drilling, each year. A day rate of \$20,000 for basic overbalanced drilling was used in the estimate.

Background

Coiled tubing drilling of oil and gas wells has been practiced since the early 1990s. Primary drivers for the development of coiled tubing services have been the ability to perform through-tubing re-entry work and to drill underbalanced. A variety of purpose-built CTD rigs exists around the world. None of them is specifically designed to access the shallow oil and gas reservoirs in the United States in a cost-effective way.

Summary

This project is developing and building an MCTR for U.S. shallow oil and gas reservoirs. The rig is being designed to improve the economics of shallow-well drilling by using small and purposed-built equipment that is easy to move and fast to mobilize, yet versatile in its application.

Among the project's achievements:

- Market analysis for the MCTR has been completed, illustrating the need for a scalable rig that can perform slimhole as

well as microhole work. This will ensure that utilization is kept high, which will keep the unit's day rate as low as possible.

- Operational analysis showed that it is feasible to drill a microhole with coiled tubing. However, with smaller coiled tubing, artificial means of obtaining weight on bit may be necessary.
- Operating scenarios were developed to evaluate various MCTR concepts with regard to rig-up efficiency and the ability to perform the necessary tasks associated with drilling a microhole.
- The final concept was developed and is currently in the detailed design process.

Current Status (January 2006)

The original proposal called for the development of an MCTR. Because of time constraints, a suitable CTD unit was found that could be modified to make the requirements set forth in the Microhole Initiative. The rig performance is being evaluated before modifications begin.

Project Start / End: 10-1-04 / 9-30-07

DOE / Performer Cost: \$1,200,000 / \$636,423

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